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The research and development activities of Research and Instruction Units at four elementary schools in Madison, Wisconsin, during the 1966-67 school year are summarized. Individualization and motivation were the focal points of these projects; special attention was given to language arts. Neither of the language environment programs yielded significant results, but pupils in the experimental group showed progress as great as or greater than that of control pupils. In a comparison of reading approaches for first-grade children, the linguistic approach was effective for girls; the basal reader approach was more successful for boys. In a sixth-grade unit, pupils using individualized reading materials performed better than pupils using basal readers. With the aid of reading consultants, the staff of one school developed a scope and sequence of skills for an individualized reading program. Primary pupils exposed to this program made greater gains in reading vocabulary and comprehension than would usually be expected. The reading program is being implemented at all grade levels in four schools for the 1967-68 school year. (Author/BS)

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REPORT FROM PROJECT MODELS

U. S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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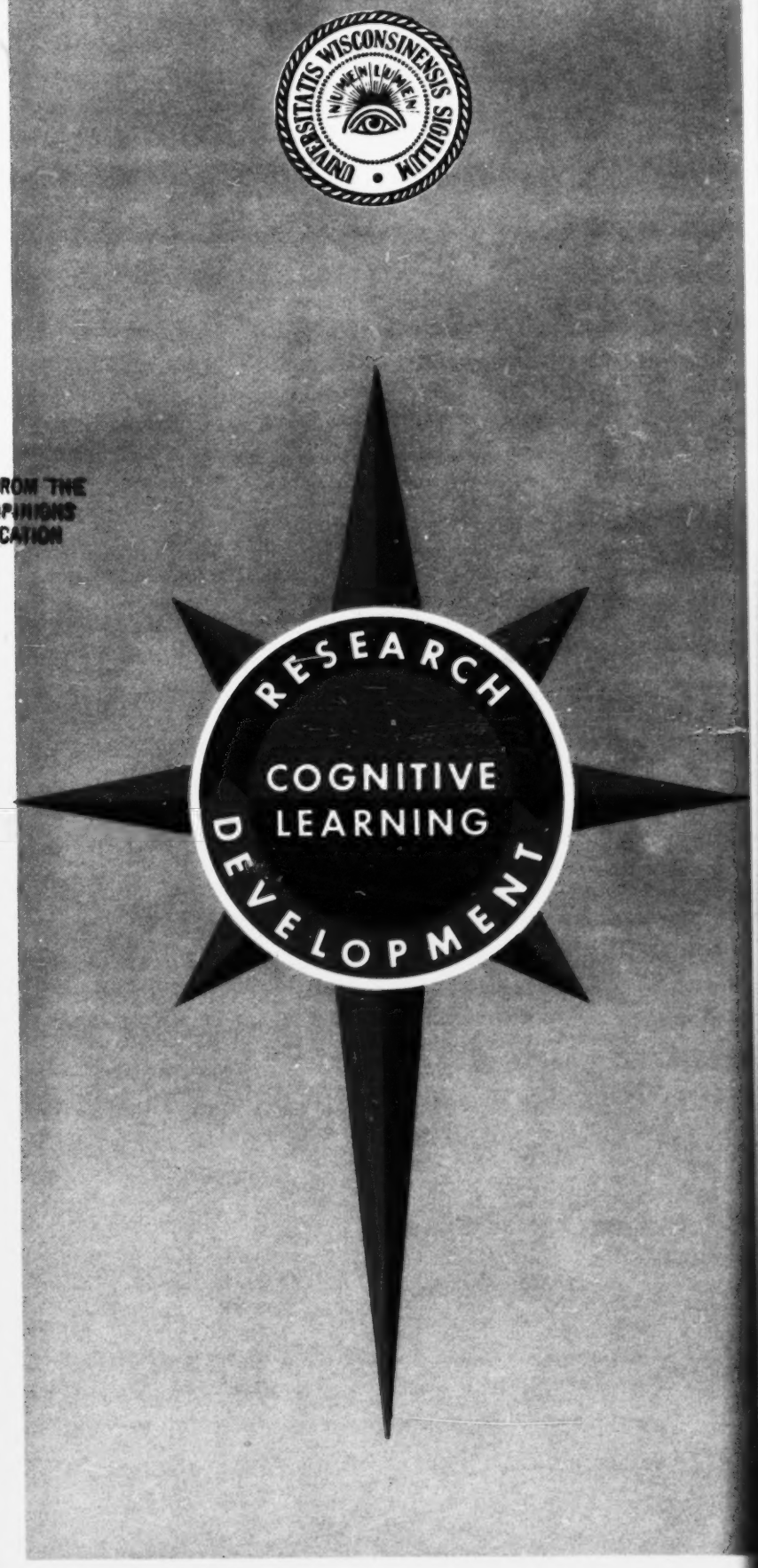

Technical Report No. 48

RESEARCH AND DEVELOPMENT ACTIVITIES IN R & I UNITS OF FOUR ELEMENTARY SCHOOLS OF MADISON, WISCONSIN, 1966–1967

Herbert J. Klausmeier and Mary Quilling, Editors

Report from Project MODELS
Richard G. Morrow and Herbert J. Klausmeier, Principal Investigators

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
Madison, Wisconsin

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PREFACE

A major objective of the Wisconsin Research and Development Center for Cognitive Learning is to develop an environment in local school buildings and systems which facilitates both student learning and research, development, and innovative activities. This report is concerned with the description and evaluation of such facilitative organizations and their activities in several elementary schools in the Madison Public School System. The report further demonstrates how instructional and supervisory personnel in the public schools, working with personnel at the Center who possess specialized knowledge in various disciplines, cooperate to extend knowledge and improve educational practice through research and development activities.

Many people, other than the R & D personnel and unit leaders denoted as authors, contributed their skills in planning, executing, or evaluating the activities reported herein. In the Madison Schools Miss Ruth Saeman, Supervisor of Reading Consultants, generously gave of her time to aid in developing the reading program. Mr. Kenneth Jensen, Director of Elementary Education, planned with Dr. Glenn Tagatz and Dr. James Wardrop, postdoctoral fellows at the Center, the field testing program.

Professor Herbert J. Klausmeier, Principal Investigator Project MODELS, initiated the idea of R & I Units and assumed primary responsibility for the conceptualization of the total R & I program and for the broad implementation strategies in the local schools. Professor Klausmeier wrote the introductory and concluding sections of this report and was assisted by Mrs. Mary Quilling in editing the report. Mrs. Doris Cook assumed primary responsibility for working with the building personnel during the year. She, Dr. Wayne Otto, Dr. Richard Smith, Dr. Wardrop and Dr. Tagatz served as consultants for the experiments reported, and Dr. Wardrop assumed primary responsibility for the field-testing report. Other Center personnel who assisted in data collection and analyses include Mrs. Barbara Kennedy, Mr. James Bavry and Mr. Louis Pingel. The editors acknowledge with appreciation the contributions of the above.

Thomas A. Romberg
Director, Program 3

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ABSTRACT

This report summarizes the research and development activities of R & I (Research and Instruction) Units at four elementary schools in Madison, Wisconsin, during the 1966-67 school year. Individualization and motivation were the focal points of these projects, with special attention given to language arts.

While neither of the language environment programs yielded significant results, pupils in the experimental group showed progress as great or greater than that of control pupils. In a comparison of the linguistic and basal reader approaches to first-grade reading instruction, the linguistic approach was found effective for girls, while the basal reader approach was more successful with the boys. In a sixth-grade Unit, pupils using individualized reading materials outperformed those using basal readers.

A scope and sequence of skills for an individualized reading program was developed by the staff of one school, with the aid of reading consultants. Primary pupils exposed to this program made greater gains in reading vocabulary and comprehension than would typically be realized. The reading program is being implemented at all grade levels in four schools in the 1967-68 school year.

I
INTRODUCTION

Securing more efficient pupil learning continues to be the main focus of the research and development activities conducted jointly by the Wisconsin R & D Center for Cognitive Learning and several school systems as part of Project MODELS. One possible means for accomplishing this is to replace the graded, self-contained classroom with a research and instruction unit (R & I Unit) in which various instructional activities may be performed more effectively. R & I Units were organized in four elementary schools of Madison during 1966-67. In each Unit the attempt was made (1) to provide excellent instruction for children, (2) to carry out research which is essential for improving instruction, (3) to develop new instructional procedures, materials, or ideas for improving instruction, and (4) to bring into the Unit promising educational innovations. The R & I Units are hypothesized to be more effective than self-contained classrooms in achieving these purposes. In order to be more effective, the role of the building principal, Unit leader, classroom teacher, and teaching aide are being refined, and new relationships involving representatives of the central staff, the school building, and other agencies are being established. Thus, the concept of improving instruction through research and development in R & I Units is complex, involving an attempt to utilize time, space, equipment, supplies, instructional methods, instructional personnel, subject-matter content and sequence, and evaluation procedures in a more effective manner to achieve an efficient total educational program for each child.

When dealing with a total program, more time is required to get the various components integrated. However, the possibility for making significant improvements is also large. During the first year, the major effort is necessarily upon achieving a smoothly operating instructional unit and gaining familiarity with research, development, and innovative procedures. While this is being done, large gains in student learning should not be expected. Once the instructional staff and children operate as a unit and better materials and methods are developed, researched, and utilized, we may anticipate substantial improvement in student learning.

The two main instructional phenomena dealt with in the Units centered on individualizing instruction and motivation. Generalists from the R & D Center worked with the staff of the schools. Subject-matter consultants from the R & D Center or the central staff of the local school participated in decision-making where subject-matter specialization was called for in connection with the program of individualization.

The approach to individualization employed in the R & D Center is one of arranging a program of instruction for each child that will meet the various objectives of the educational program. This, in turn, calls for some instruction on a one-to-one basis, some small group, and some large group instruction.

In instruction on a one-to-one basis, the child proceeds at a rate appropriate for him. This type of individualized work with the teacher and independent study are required to meet those objectives concerned with the acquisition of independent skills. Some educational objectives require instruction in small groups. Pupils may be brought together in groups of 3 to 15 or more to work on specific activities of a fairly homogeneous type; for example, 5 to 15 children from a total group of 100 may be brought together for specific instruction related to acquisition of certain concepts or processes in arithmetic. Small groups also may be brought together to deal with the same word recognition skills. Small groups may be formed on the basis of interest, friendship, neighborhood, residence, and the like in social studies in connection with achieving certain objectives related to communication skills and attitude development. The extent to which large groups of 75 to 150 children may be brought together effectively has not been tested systematically. It is known

that students may engage in individual study activities simultaneously in large groups. In the Units in the elementary school, the principal reason for bringing all the students within the Unit together into the same group for part of the instructional day is to achieve better utilization of teacher time. Children participating in independent study or some other large group activity can proceed without all of the instructional staff of the Unit being present. This, in turn, frees part of the instructional staff during that period of time for planning, conferring, and executing other activities essential for making the small group and one-to-one instructional activities work effectively.

Attention was also given throughout the year to research and development regarding motivation. Getting a larger number of students to want to learn and also to behave well is a continuing responsibility of R & I Units. We appear to have sufficient knowledge about the means of controlling behavior of young children so that few discipline problems should emerge in the elementary school. Devising procedures for applying this knowledge and testing some of the procedures is a continuing activity in R & I Units. From the preceding it may be properly inferred that no systematic attempt was made to improve instruction in any one subject-matter field in each Unit. This will be done more systematically in 1967-68.

In early 1966-67 a plan for field testing the R & I Units, developed by Wardrop and Tagatz, was reported in Working Paper No. 4 of the Wisconsin Research and Development Center for Cognitive Learning. Only parts of the total plan for field testing were executed during the 1966-67 school year. Also, the attempt was made to utilize the local resources of each school system in the field of testing, including each school's testing program; therefore, the amount of information obtained regarding the Units varied within a school system and across school systems. In some of the elementary R & I Units field test data were gathered dealing with pupil achievement in the Units as measured by standardized tests. Instruments were developed to secure the opinions of teachers and principals as to how well the research, development, and innovation functions were being achieved. In the main, then, field testing procedures and instruments were tried during the year, and the data obtained yield some preliminary information about the functioning of Units in settings of one or two Units in new elementary school buildings.

One of three instruments which was developed was an opinion scale to secure opinions of teachers and building principals regarding the functions of the Unit and also to determine the effects of the Unit organization on teachers, students, and instructional practices. In the same opinionnaire information was secured regarding the utilization of resource persons and knowledge of individual students by the instructional staff. Another instrument, a check list, was developed for the purpose of determining the adequacy of the facilities, equipment, and supplies with respect to accomplishing the objectives of the R & I Units. Finally, the field testing provided information regarding adequate control groups for R & I Units and also the extent to which different strategies for ascertaining pupil achievements were appropriate for this type of field study.

II

FRANKLIN SCHOOL

James Wardrop, Doris Cook, and Glenn Tagatz
R & D Center
Flora Christopher and Joyce Peterson, Unit Leaders

R & I Units were organized in the kindergarten and first grade in September, 1966. The building principal, Leonard Rush, and the two Unit leaders, Mrs. Flora Christopher and Miss Joyce Peterson, received much of ther initial introduction and orientation to the R & I Unit concept while attending an eight-week Institute during the summer of 1966. Regular meetings with other Unit leaders provided the staff with ideas for organizing their Units. Identifying a problem or concern that could be explored during the school year 1966-67 became the basis for independent study throughout the summer.

Franklin Elementary School has a considerable number of Title I students. The central staff of Madison Elementary Schools was searching for ways of meeting the needs of these educationally deprived children. They saw in the R & I Unit concept an opportunity to lower the pupil-teacher ratio with the additional staff member provided in the Unit leader as well as an opportunity to find instructional approaches and materials suitable for these children. Two R & I Units were organized, one in the kindergarten and one in the first grade. While each Unit identified an immediate problem to be researched, the two Units under the leadership of the principal, Mr. Rush, worked cooperatively in an effort to improve home and school relationships.

The need to make an impact on achievement of these children caused these teachers to select parental education and motivation as a second big task. A program was designed specifically for parents to help bridge the gap between home and school. In addition to the usual home and parent contacts, these parents were invited to five meetings throughout the year. Informal discussions with much time for parents' questions was the usual procedure for these meetings. Sessions included (1) explaining the purpose of the R & I Unit organization and program, (2) familiarizing parents with materials and techniques that could be used at home with their youngsters, (3) demonstrating and explaining the specific instructional program.

In addition to these meetings two central office communiques were sent to the parents. The Newsletter included the monthly calendar, reports of special events, articles from recent periodicals that would be of interest to parents, and recommended books, games, or TV shows for the children. Of special interest each month was a section on Suggested Activities for Having Fun with Your Child or Things You Can Do at Home. Teachers as well as the principal felt that such a personalized approach with the parents was worthwhile. They felt the year's efforts in this area helped to (1) attain a more desirable rapport between the parents and the school; (2) familiarize the parents with the instructional program and the educational objectives of the school; (3) develop a more positive parental attitude toward the school which hopefully would influence the children's attitudes.

LANGUAGE ENRICHMENT, KINDERGARTEN UNIT

The kindergarten R & I Unit included a staff of three, Mrs. Flora Christopher, Miss Judith Hagemann, and Miss Jean Morgan, and 100 children, one-third of whom were classified as disadvantaged.

Two of the classrooms were nearly adjacent, while the Unit leader's room, used for small group instruction, was some distance away.

All of the pupils could meet simultaneously in one of the rooms. The typical daily pattern was for pupils and teachers to be in more than one room and for teachers to meet with more than one group of children. The school was supplied with a wide range of high quality instructional equipment and materials. Meetings of the Unit leader with Unit teachers took place an average of 5-10 times a month. Of special interest at the meetings were the ideas shared by one of the teachers who had previously taught in a Montessori school. Meetings of Unit personnel with the building principal, central staff, R & D staff, and parents averaged four or less a month. The building principal took the initiative for the formation of this group.

The goal agreed upon by this staff was to develop an excellent program of instruction to meet the needs of these children. Since it is suspected that retarded verbal development is a result of deprivation rather than a concomitant or a cause, this area was selected for special attention and experimentation. The specific problem dealt with in Franklin School kindergarten was whether, in addition to the regular program, a language experience program would be effective in increasing the verbalization and vocabulary of disadvantaged children.

Subjects

Thirty-nine subjects were used in the experiment. They ranged in age from 4–9 to 6–8, with the average age being 5–3. Approximately 30% came from families which would be classified as lower class. About 27% were Negro.

Design and Procedure

The experimental groups were formed in the following manner: sixteen pupils from the morning class, eight from "advantaged" backgrounds and eight from "disadvantaged" backgrounds, were assigned to the experimental groups. The same thing was done for the afternoon class, except that six advantaged and nine disadvantaged children were used. Eight other students, four advantaged and four disadvantaged, were assigned to the control group. These thirty-nine children were randomly selected from the kindergarten population stratified according to socioeconomic background and time of their kindergarten class. Well-defined lessons were prepared and executed by the teachers, who rotated in teaching the experimental group. The small group instruction (the experimental groups) was carried on while the other kindergarten children, including the control group, were engaged in activities of the regular kindergarten program which were not primarily related to language experiences—such as rest periods or routines.

The main objective in these experimental groups was to provide many opportunities for children to express their ideas and respond to various stimuli. The teachers employed many motivational techniques to encourage children to verbalize such as providing feedback to their responses, by giving social reinforcement, by encouraging one-to-one sharing, and by providing intrinsic rewards, such as new games, manipulative play devices, and making "treats" in the kitchen. Exemplary models such as a policeman, a bus driver, and a foreign student enrolled in the school were brought in once a week.

The Peabody Language Kit, the Ginn pre-reading kit, and many audiovisual aids were used. The tape recorder was used to provide opportunities for the children to hear themselves.

Data Collected

The Peabody Vocabulary Test, Form A, was given as a pretest. The dependent variable was a teacher-made test in which subjects responded verbally to two pictures. One of these pictures had as a central theme one of the activities in which students in the experimental groups had participated during the school year, while the second picture had a theme unrelated to any specific activity during the school year. Students were asked one at a time to describe or discuss the contents of each of these pictures. Their responses were tape-recorded and a subsequent analysis was made of the number of words used in response to each picture as a measure of the verbal fluency of these children.

Analysis of Data

Two analyses were carried out on the data. An analysis of variance was first performed on scores for the Peabody Picture Vocabulary Test that had been given to the subjects in this experiment prior to the time that the experiment was undertaken. The two dimensions, Morning vs. Afternoon and Advantaged vs. Disadvantaged backgrounds, yielded no F's significant at the .05 level. However, the F ratio due to the background of the children was significant at the .10 level on this initial measure of verbal ability. This significant F reflected the fact that the mean for the children with advantaged backgrounds was greater than the mean for children from disadvantaged backgrounds. The respective means were 55.21 and 51.33. This finding concurs with earlier research.

The second analysis was performed on the two scores each subject earned on the teacher-made test. The multivariate analysis of variance examined the effects of background (advantaged vs. disadvantaged) and of groups.

The three groups considered in this analysis were experimental morning, experimental afternoon, and control. The sum of squares for groups was partitioned to obtain contrasts between the two experimental and one control group, and between the morning and afternoon experimental groups. Neither the effects nor their interaction were significant.

The means for the groups are presented in Table 1. Note that, in general, experimental groups outperformed the control group in performance on Picture I, which depicted an activity in which experimental children had participated during the school year.

An interesting aspect of the results is that disadvantaged children outperformed advantaged children within the same group on at least one of the pictures, in contrast to the results of the pretest analysis. This suggests the effectiveness of the treatment for the disadvantaged child.

Table 1

Mean Number of Responses to Pictures by Subgroups

		Picture 1 (Familiar)	Picture 2 (Unfamiliar)
Experimental—morning	Adv.	59.25	13.63
	Dis.	37.13	13.88
Experimental—afternoon	Adv.	40.83	10.17
	Dis.	44.33	16.33
Control	Adv.	23.60	18.60
	Dis.	24.67	10.00

THE LINGUISTIC APPROACH TO READING,

FIRST-GRADE UNIT

The first-grade R & I Unit at Franklin School included, in addition to Unit leader, Joyce Peterson, three classroom teachers, Mrs. Jackie Schmitt, Mrs. Sandra Kent, and Mrs. Jonnie Sue Reed. There were 85 first-grade students, one-third of whom came from disadvantaged homes. The staff of this Unit cooperatively planned and taught the mathematics program. The complete student population was grouped into four achievement levels in math and appropriate instructional materials were rovided, including many concrete experiences nd manipulative devices. Understanding ather than computation was emphasized. hese teachers also shared ideas and plans to provide an excellent social study program. Field trips and audiovisual materials were used extensively.

The staff, however, was concerned with the large number of children having reading difficulties and selected this area as their major concern. The Unit leader assumed the responsibility for instructing the experimental program in reading. The problem was stated as follows: Is the present basal reading series adequate for teaching beginning reading to culturally disadvantaged children, or would a linguistic approach be more effective?

Subjects

The subjects were selected from the lower one-third scores on the Clymer-Barrett Reading Readiness Test. They were stratified by sex and ten (10) each were randomly assigned to the experimental and control groups. The mean age was 6–8 with a range from 5–11 to 7–6. The mean IQ of these subjects as measured by the Ammons Quick Test was 80.

Experimental Treatments

The experimental treatments were closely related to the instructional materials. In fact, this was the independent variable. The learning specialist assumed responsibility for the teaching of both treatments. The treatments were:

1) Control group—This group used the Ginn Basic Readers for first grade. The typical basal approach as outlined in the manual was followed. The specific books used included the series beginning with Little Red Storybook through the book The Little White House. Workbooks and teacher developed activities were used along with the readers.
2) Experimental group—This group used the McGraw-Hill programed materials published by Sullivan Associates, basically a linguistic approach. An effort was made to provide many high interest books for independent reading. In addition to the programed materials, the hard cover story books by McGraw Hill and the linguistic readers from Harper & Row and Science Research Associates were used.

The treatments were each administered two one-half hour periods daily for four days each week and one one-half hour period on Friday. The experiment ran the entire year.

Data Gathered

A series of inventories and tests were developed by the teachers, including:

1) An inventory of reading interests.

2) A vocabulary test of randomly selected words from both the experimental and control materials.
3) A word analysis test based upon vocabulary from both programs.
4) A comprehension test based on both the linguistic and the basal material.

In addition to these teacher-developed tests, the Stanford Achievement Test was given in May. The subtests relevant to this experiment were word reading, paragraph meaning, vocabulary, and word study skills.

Results

The eight posttest measures were analyzed using a two-way multivariate analysis of variance. The two factors were Group (Treatment vs. Control) and Sex. The multivariate analysis revealed no significant difference between groups, a significant ($p < .05$) sex effect (the discriminant scores for girls being 3.38 greater than for boys), and a significant ($p < .10$) interaction. Univariate analyses of variance for the eight variables indicated significant ($p < .05$) sex differences favoring females on the teacher-made vocabulary test and the Word Study Skills subtest of the Stanford Achievement Test. The means for the two sex effects are reported in Table 2. In addition to the striking differences in performance in these two tests, the girls outperformed the boys on all other subtests, except reading interest.

Table 2

Means for Variables for Which Significant Sex Differences Were Found

Variable	Males	Females
Teacher Vocabulary	34.4	46.5
Stanford Word Study	1.4*	2.0*

*Grade-equivalent scores

Significant ($p < .05$) interactions were located for the paragraph meaning and vocabulary subtests of the Stanford Achievement Test. The subgroup means for these interactions are presented in Tables 3 and 4.

Note that in both cases the performance of males in the experimental group was inferior to that of males in the control group, while for females the situation was reversed. The same tendency, though less marked, was found for all tests other than interest. A tentative conclusion might be that the linguistic approach, as it was employed in this experiment, is effective for females but actually hinders males. Of course, the number of subjects used was too small to attempt to generalize beyond the groups employed.

Table 3

Means for Group x Sex Interaction: Stanford Paragraph Meaning

	Sex	
Group	M	F
Experimental	8.0	18.6
Control	15.0	11.3

Table 4

Means for Group x Sex Interaction: Stanford Vocabulary

	Sex	
Group	M	F
Experimental	15.6	24.4
Control	20.6	17.3

Mean grade equivalents for the two groups on the Stanford subtests are also of interest (Table 5). The test was administered in the eighth month of first grade. Although the table of means indicates that the group's performance was slightly below grade level on most subtests, considering initial selection procedures and the mean IQ of 80 this result was not unexpected. The table further shows that performance of the two treatment groups was comparable.

Table 5

Mean Grade Equivalents on Stanford Achievement Reading Subtests for Experimental and Control Groups

Groups	Word Reading Test	Paragraph Meaning	Vocabulary	Word Study Skills
Experimental	1.7	1.7	1.8	1.7
Control	1.7	1.7	1.9	1.6

Discussion

The sex differences in various subtests could have occurred because of maturational differences in boys and girls. This is a subject

of much concern throughout the nation. A question needing investigation is whether the boys would have benefited more from an additional semester of reading readiness before attempting any actual reading program.

The Unit leader's reactions to this study varied as the year progressed. She commented: "During the readiness stage I became quite discouraged with the linguistic approach as children found it very difficult to learn the alphabet and the sounds connected with it. However, once this stage was mastered I have been quite impressed with the way they are able to proceed. They have the skills which are necessary to figure out new words and to proceed at their own rate of learning.

"Towards the end of the year I became somewhat discouraged with the basal program as it is so difficult to individualize and those who have trouble with sight vocabulary do not have the means of figuring out the words.

"Overall, I feel that the experimental group are probably somewhat better readers."

III

LONGFELLOW SCHOOL

LANGUAGE ENRICHMENT FOR DISADVANTAGED CHILDREN, FIRST GRADE

James Wardrop and Doris Cook
R & D Center
Wilma Ferris, Unit Leader

The concern of the Madison Public Schools central staff to provide good instructional programs for the early grades for the Title I schools led to the establishment of an R & I Unit in the first grade at Longfellow School, of which Mr. Walter Argraves was principal. This Unit was relatively small; many of these children came from homes where a language other than English was spoken.

The Unit leader, Mrs. Wilma Ferris, and the first-grade teacher, Mrs. Nancy Gorchels, designed a program of language development for the first-grade children which was in addition to the regular first-grade curriculum. Because of their regular teaching load, this group functioned as a Unit only for this part of the instructional program.

The main concern of the R & I Unit, then, was whether a language-oriented program in addition to the regular first-grade curriculum would increase the disadvantaged child's verbal fluency and also help him to acquire early reading skills.

SUBJECTS

Twenty-four subjects were used in this experiment, seven girls and seventeen boys. They ranged in age from 5–10 to 6–11, with the average being 6–5. The subjects came from low and low-middle socioeconomic backgrounds. After being stratified according to sex, they were randomly divided into three groups — two experimental groups and one control group. In the first experimental group, there were six males and two females; in the second, there were five males and three females; and in the third (control) group, six males and two females.

TREATMENTS

The control group continued with their regular class work, receiving the usual language experiences with their classmates as suggested in the Madison Public Schools K–3 English Language Arts Handbook and the regularly scheduled prereading and reading program. Texts used included Scott-Foresman, Ginn, and Macmillan, all at the preprimer and primer level.

The two experimental groups each met for thirty minutes a day, four days a week for sixteen weeks for supplementary well-defined learning experiences. This was in addition to their regular schedule. The language experiences included poetry, stories, rhymes, listening to tapes and records, and dramatizing stories. "Experience stories" were taped by the children and replayed for their classmates. As a part of the vocabulary development program, children were given experiences in naming, labeling, and trying out words as these related to objects in the environment, family interactions, textures, sensory stimulation, and other experiential objects and activities. A wide variety of supplementary material was used with these experimental groups. There was no difference in the treatment given the two experimental groups. Teachers rotated among the three groups.

DATA COLLECTED

Prior to the start of the experiment, the Clymer-Barrett Reading Readiness Test and Peabody Picture Vocabulary Test, Form A, had been administered; at the conclusion of the experiment, the subjects were administered Form B of the Peabody test, the Gates-MacGinitie Reading Test, and a teacher-made fluency test

consisting of two pictures. Picture 1 contained material pertinent to the experiences to which the children were exposed during the language class; Picture 2 contained materials unrelated to the experiences and activities of the class. The pictures were shown to individual students and they were asked to describe or discuss them. The scores obtained were the number of words used by the child when talking about each picture.

ANALYSIS OF DATA

Analyses of data were all based on a 3 x 2 design. Table 6 indicates the levels of each factor and the number of subjects in each cell of the design.

Table 6

Design of Longfellow Language Enrichment Experiment

Group	Male	Female
Experimental 1	6	2
Experimental 2	5	3
Control	6	2

Three analyses were performed to assess the effectiveness of the language program. The first, a multivariate analysis of variance, was carried out on the two scores each subject obtained on the teacher constructed fluency test. The second and third analyses were analyses of covariance. One of these was performed on the Peabody Vocabulary Test data, utilizing the spring score as dependent variable and the fall scores as covariate. A corresponding analysis was conducted using the Clymer-Barrett as covariate and the Gates-MacGinitie as the dependent variable.

In all three analyses, the sum of squares for groups was partitioned into a part due to the experimental and control group contrast and a part due to the contrast between the two experimental groups.

None of the effects were significant. However, the combined experimental groups outperformed the control group on three of the four criterion measures as Table 7 indicates.

As expected pupils were more fluent in their reaction to Picture 1, which depicted a familiar situation, than to Picture 2.

Consequently, it would seem that with this group of first-grade children, the language enrichment program had no measurable effect. It is possible students in all groups profited from the program, as a result of carryover effects into the regular instruction and as a result of the interaction of students in the experimental groups with those in the control group. An inspection of the differences in mean performance on the two forms of the Peabody indicates that the students in the experimental groups gained an average of 12 points over the course of the experiment, while students in the control group gained an average of 4 points. Thus, although the analysis did not reveal any significant treatment differences, the magnitude of these differences suggests that experimental treatment may have been successful.

Table 7

Weighted Means of Experimental and Control Groups as Criterion Measures

Group	Peabody B	Gates-MacGinitie	Picture 1	Picture 2
Experimental 1	74.75	42.75	141.50	107.25
Experimental 2	69.38	36.00	112.87	87.25
Control	68.89	53.75	98.50	88.87

DISCUSSION

A look at this experiment and a similar experiment at the kindergarten level (see the discussion of the kindergarten R & I Unit at Franklin School) indicates that, if teachers make a concentrated effort to raise the level of verbal fluency of children from disadvantaged areas at an early age, some improvement will result. That the improvement was not striking reflects two things: first, the amount of time over which these experiments were carried out was limited in comparison to the amount of time these children have had to develop whatever language deficiencies they possess, so that it would be naive to expect major improvements as a result of these rather short experiments; secondly, the experimental treatments themselves were not administered as intensively as they might have been in order to show a more startling change in these children at this point in time. What is implied here is that a systematic program of language enrichment in the kindergarten and primary grades might very possibly enable students from disadvantaged backgrounds to overcome the handicap of their background, and as a result to overcome also the difficulties they encounter in our verbally oriented educational system.

The two experiments discussed are not conclusive, but provide an indication that intensive language development programs might be effective. That further research is needed in this area is an overworked and frequently escapist conclusion, but in this case it seems to be appropriate.

Since language is a prerequisite to almost all learning, helping children to communicate easily and understandably is one of the major responsibilities of preschool, kindergarten, and first grade. Research carried on throughout the country indicates that language development programs are often nondeliberate and incidental. Perhaps teachers do not capitalize enough on opportunities to stimulate children's verbalization. Often they do not "lend a listening ear".

Teachers at the preschool and kindergarten levels long have felt the need for the child to have many experiences to expand his world. Manipulative games and devices, much free and self-chosen play, and the creative arts have been the setting for most programs. What is needed now is for teachers to define specific goals which may be attained by classroom "experiences." From such definition would follow choice of motivational techniques effective in eliciting the child's response.

A language development program should probably include activities to develop both an expressive and a receptive language. Expressive language is the child's way of verbally expressing himself and is important as a means of communication. Receptive language develops understanding and conceptualization. Both are vitally important for achievement in reading.

IV

MARQUETTE SCHOOL
MOTIVATION AND INDIVIDUALIZATION, GRADE 6

Doris Cook, Glenn Tagatz, James Wardrop, and Mary Quilling
R & D Center
Paulette Lindloff, Unit Leader

The sixth grade at Marquette Elementary School has been organized as an R & I Unit since the beginning of the project in 1965-66. This school was chosen for several reasons: One-third of the students were identified as culturally deprived, and it was felt an added staff member provided in the R & I Unit would reduce the pupil-teacher ratio and would provide additional help for students with reading difficulty. Additionally, the central administration saw an opportunity to experiment with new instructional materials and new methods with this unique student population.

The 1966-67 staff of the R & I Unit was as follows: Miss Paulette Lindloff, Unit leader; Miss Joan Sheviakov, Mr. John Salzgeter, and Miss Barbara Slygh, certified teachers. Mr. Kermit Frater is the principal who provided continuous support and enthusiasm for the project.

Adjacent rooms were available for each staff member; however, these were not large enough that all pupils could meet simultaneously in one or two of them. The typical daily pattern was for pupils and teachers to be in more than one room and for teachers to meet with more than one group of children. Easily available instructional equipment was of good quality and included a 35 mm. projector, record player, overhead projector, textbooks, and teacher supplies. A tape recorder, records, listening kits, and study carrels were not available. Meetings of the Unit leader with the principal and with her staff averaged eleven per month. Meetings of the Unit personnel with parents of the children were also this frequent. Meetings of the entire Unit staff with the building principal and of the Unit leader with central staff members were also frequent. Teachers were not given an option regarding their participation at the inception, but all wish to continue in this organization during the following year.

During the 1965-66 school year the Unit staff had an opportunity to familiarize themselves with a diagnostic approach to reading. The Unit leader, while attending the summer institute as well as seminars at the R & D Center, examined many reading programs. She purchased new reading materials on the advice of the Madison Public Schools reading consultant, Miss Ruth Saeman. A diagnostic reading test was administered to the entire student body of this grade. Problem areas and individual needs were determined. Then an instructional program was planned. Of special value were the various flexible groupings and a wide variety of high interest—low vocabulary reading materials.

To assess the effectiveness of a reading program using these materials, a controlled experiment was planned for the subsequent school year. Also of interest was the effect a concrete reward would have in motivating a student's reading performance. Thus, there were two experimental manipulations, one regarding materials and the other concerning rewards. The problems were stated as follows: (1) Will the areas of vocabulary development, comprehension, and study skills be significantly improved by the use of selected reading materials over the use of a traditional basal reader approach? (2) Will a motivational reward-system significantly affect reading achievement?

MANIPULATION OF MATERIALS

The experimental groups used the following materials:
The Controlled Reader
SRA Pilot Library IIc
SRA Reading Laboratory IIc
Coins to Kings (text) Harper and Row, 1964
Reading-Thinking Skills, (third through fifth grade level) Continental Press, Inc.
Library reading was encouraged for all students
Teen-Age Tales A–C and Nos. 2–6

In addition the following materials were used by achievement levels:

Low Achievers
Barnell-Loft Series, (part D) Following Directions and Using the Context
High-Interest, Low-Ability Readers, Webster Everyreaders (paperback)
Morgan Bay Mystery Series, Deep Sea Adventure Series (Book 1–4) Harr Wagner Publishing Company.

High Achievers
Students' participation maximized with analytical discussion of student-chosen books, short-story writing, and test preparation.

The instructional program for these groups was planned one week in advance by the two instructors assigned to the two experimental groups. Objectives relating to five areas of reading were precisely stated, and material from the above list was selected to meet these objectives.

The control groups' instructors utilized basal readers and library reading. The following texts were used with particular achievement groups:

Low Achievers
Trails to Treasure (text and workbook, Ginn & Co., 1956. This is written at a fifth-grade level.)

Average Achievers
Aboard the Story Rocket (text) Singer Co., 1960

High Achievers
Bright Peaks (text) Houghton Mifflin Co., 1962.
Into New Worlds (text) Macmillan Co., 1966. (This text was used as a supplement.)

Instructors assigned to the control group tried to maintain their usual method of teaching reading; that is, following the textbook manuals for the entire treatment. Pupils were grouped as high, average, and low achieving readers and read from the respective readers. Silent reading predominated most of the time with some additional work from workbooks, suggestions from the teacher's manual, and teacher prepared materials.

Occasionally additional stimulus was added. For example, one of the instructors conducted a contest between the three achievement-level groups by having each group prepare a bulletin board related to one of the stories in their reader. They were judged on (a) originality, (b) artistic ability and (c) how well their work related to the story.

MOTIVATIONAL MANIPULATION

The experimental groups were rewarded for performance on specified reading tasks once each week. Play money was distributed and saved by the pupils. At the conclusion of each ten-week period, experimental subjects had the opportunity to cash in their play money for goods in an auction-type situation.

The control group received the usual rewards dispensed by a classroom teacher— verbal remarks and grades or comments on papers.

PROCEDURES AND DESIGN

Four treatment groups were formed. The 58 students in the Unit were stratified by sex and randomly assigned to one of the four groups.

Two groups used experimental materials throughout the twenty-week experiment and two used traditional materials. During each ten-week period one experimental and one control group received monetary reward. So that all children had this experience during the course of the experiment, the groups receiving the reward were reversed midway through the experiment. The following diagram (Table 8) clarifies the design of the experiment.

Table 8

Experimental Design

Reward	Materials	
	Experimental	Control
No reward— 1st 10 weeks	N = 12	N = 14
Reward— 2nd 10 weeks	6 boys	7 boys
	6 girls	7 girls
	N = 15	N = 15
Reward— 1st 10 weeks	7 boys	6 boys
No reward— 2nd 10 weeks	8 girls	9 girls

The three teachers and learning specialist shared the instructional tasks. Teachers were rotated every five weeks so that they taught each group for one period and administered each reward system for half of the experiment.

DATA COLLECTED

The beginning and end of the experiment were planned to coincide respectively with fall and spring administration of the Iowa Tests of Basic Skills. The vocabulary and reading subtest scores were utilized. Additional tests were given before and after the experiment, as well as at the midpoint when motivational techniques were reversed.

The Bond-Clymer-Hoyt Developmental Reading Test was administered in October and in April. Teacher-made tests drawing from the material covered in both experimental and control groups were administered after ten and twenty weeks. The test consisted of the following sections:

a. Vocabulary
b. Purpose in reading
c. Reading a graph
d. Reading for appreciation
e. Reading comprehension

In summary, the data collected is as follows:

Data Gathering Plan

Pre-experiment	10 week	Post-experiment
Bond-Clymer-Hoyt	Teacher controlled test	Bond-Clymer-Hoyt
ITBS Vocabulary		ITBS Vocabulary
ITBS Reading		ITBS Reading
		Teacher-constructed test

ANALYSIS OF DATA

The mean grade equivalents for the pre- and post-experimental administration of the Bond-Clymer-Hoyt, ITBS Vocabulary and Reading subtests are presented in Table 9. Inspection of the gain scores indicates that three of the four treatment groups had higher scores on all three posttests.

An analysis of covariance was performed on each posttest using the appropriate pretest as a covariate.

No significant differences were found on analyses of the Bond-Clymer-Hoyt Developmental Test, on the ITBS Vocabulary subtest or teacher-constructed test, the covariate for which was the same test given at ten weeks.

Analysis of the ITBS reading subscores, however, revealed several sources of significance as Table 10 indicates. The mean

Table 10

Analysis of Covariance of ITBS Reading Subscores

Source	df	MS	F	
Materials	1	520.369	5.199	p<.05
Motivation	1	646.680	6.460	p<.05
Sex	1	181.367	1.812	
Materials x Motivation	1	13.532	0.135	
Materials x Sex	1	13.411	0.134	
Motivation x Sex	1	9.151	0.091	
Motivation x Materials x Sex	1	639.283	6.387	p<.05
Error	47	100.098		

Table 9

MEAN GRADE EQUIVALENTS OF SUBGROUPS ON PRE- AND POSTTESTS

		Test								
		Bond-Clymer-Hoyt			ITBS Vocabulary			ITBS Reading		
Materials	Motivation	Pre	Post	Gain	Pre	Post	Gain	Pre	Post	Gain
Experimental	(No reward - 1st 10 wk.) (Reward - 2nd 10 wk.)	5.8	6.4	.5	6.9	7.1	.2	6.4	7.2	.8
	(Reward - 1st 10 wk.) (No reward - 2nd 10 wk.)	5.8	6.2	.4	6.2	6.7	.5	6.3	6.5	.2
Control	(No reward - 1st 10 wk.) (Reward - 2nd 10 wk.)	5.7	6.1	.4	5.7	6.3	.6	6.0	6.3	.3
	(Reward - 1st 10 wk.) (No reward - 2nd 10 wk.)	5.7	6.2	.5	6.5	6.5	0.0	6.5	6.0	-.5

adjusted score of the groups using experimental materials was significantly greater than that of the groups using basal readers solely. Furthermore, the groups receiving the reward during the second ten-week period performed significantly better than did the groups receiving the reward first.

To aid in interpreting the latter result, an analysis of covariance was performed on the ten-week teacher-constructed test, using the ITBS reading subtest score from the October administration as a covariate. The groups using experimental materials again outperformed the groups using control materials, but the motivational system was not a significant factor, as Table 11 indicates.

Table 11

Analysis of Covariance Performed on Ten-Week Teacher-Constructed Test

Source	df	MS	F	
Materials	1	182.022	3.583	p<.10
Motivation	1	39.046	0.769	
Sex	1	137.786	2.713	
Materials x Motivation	1	269.485	5.305	p<.05
Materials x Sex	1	2.794	0.055	
Motivation x Sex	1	0.907	0.018	
Motivation x Materials x Sex	1	38.898	0.766	
Error	47	50.796		

Because a complete rotation of teachers occurred across treatments only upon the conclusion of the study, random teacher differences are confounded with both materials and motivation and with their interaction in the above analysis. Significant and nonsignificant effects must consequently be evaluated cautiously. From the table of adjusted means (Table 12), however, it seems reasonable to conclude that the group using experimental materials and receiving usual verbal rewards outperformed all other groups.

Table 12

Adjusted Means on 10-Week Teacher-Constructed Test

		Materials	
		Exp.	Cont.
No reward - 1st 10 wk.	Boys	61.542	51.978
Reward - 2nd 10 wk.	Girls	63.237	56.378
	Mean	62.389	54.178
Reward - 1st 10 wk.	Boys	53.281	55.885
No reward - 2nd 10 wk.	Girls	58.967	57.542
	Mean	56.124	56.714

DISCUSSION

Analyses performed at the end of ten and twenty weeks point to the effectiveness of the experimental materials used. The manipulation of materials apparently more greatly influenced student performance than did the motivational manipulation. It is entirely possible, moreover, that the intrinsic qualities of the experimental materials had more incentive value than did the play money, or that the immediacy and nature of feedback provided by an instructional program using experimental materials are more reinforcing than in the traditional program. These interpretations suggest that the study focused on a comparison of two motivational procedures. Interestingly enough, the one more typically used in the school setting and more readily available to the teaching staff was the more effective.

Interpretation of the results of the reward manipulation is difficult. While means were in the expected direction at the end of twenty weeks, they were not after ten weeks. Teacher differences, it was noted, were confounded in the experimental design, and the teachers also had considerable latitude in dispensing the rewards. It is possible that this motivational procedure is more effective when used by some teachers than others. Future experiments should be planned to investigate the effects of this technique and variables which influence its efficacy.

V

HUEGEL SCHOOL
DEVELOPING A FACILITATIVE ENVIRONMENT FOR AN INDIVIDUALIZED READING PROGRAM

Richard J. Smith and Doris M. Cook
R & D Center
Patricia Wojtal and Betty McMahan, Unit Leaders

The Ray W. Huegel School in Madison, Wisconsin, was architecturally planned to permit freedom of movement and flexible groupings of students in a nongraded elementary school. The school was built in the round with all rooms adjoining the large instructional materials center which is the physical focus of the school. Sliding dividers between the rooms permit them to be combined or separated. There is also a room available for use as a large-group instructional center. The Wisconsin R & D Center was involved in the planning and developmental aspects of this program while the school, Madison's first nongraded elementary school, was being built. The actual program got under way when the school opened in September, 1966, under the leadership of Mr. Jerry Johnson, who had been appointed principal before the school was built so that he could participate in the planning of the school.

The regular teaching staff, consisting of 15 teachers, two of whom were Unit leaders, and two paraprofessionals, was organized into two R & I Units. The Unit leaders instructed pupils half days and provided leadership in the development of the curriculum during part of each day. Additionally, a certified librarian and paraprofessional worked in the instructional materials center.

Figure 1 shows the organizational plan.

The diagram further indicates that during the first year of operation Huegel school enrolled slightly over 400 students. The socio-economic status of the families from which they came ranged from lower-middle to upper-middle class as those classes are typically defined. Most pupils had transferred from one of four different elementary schools in Madison.

Huegel School was completely organized into R & I Units primarily to provide a facilitative environment for an individualized reading program. Through cooperative planning the Unit leaders arrived at a plan that seemed to be a way to incorporate the nongraded approach and team teaching into their reading program. Since their plan involved the periodic exchange of materials and student groups by the teachers it was necessary to devise a plan to provide for continuity and comprehensiveness. The remainder of this report is devoted to explaining the rationale of the reading program and recording progress toward its implementation.

Development in and through reading is influenced by intellectual, physical, emotional, environmental, and educational factors. Since these factors exist and combine differently for each individual, it has long been recognized that the teaching of reading should be as individualized as possible. The developmental activity at Huegel School is an attempt to provide a facilitative environment for an individualized reading program. This program has been labeled "prototypic" because it is being designed to permit other schools to use its theoretical structure as a base for the development of variously implemented individualized reading programs.

The major theoretical assumptions underlying the reading program could be summarized as follows:

1. The elementary school can be organized to implement successfully an individualized reading program that ignores grade lines.

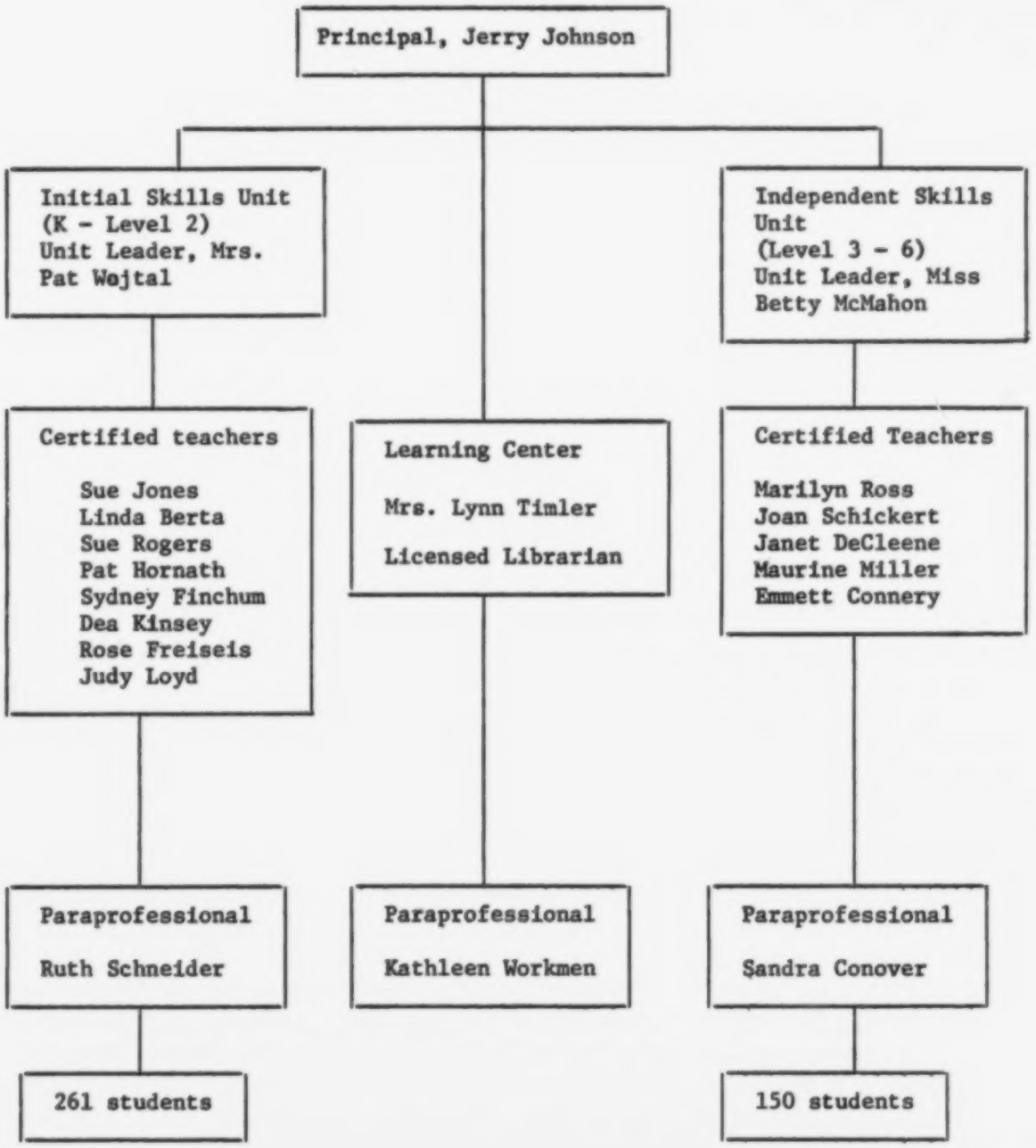

Fig. 1. — Huegel School

2. An individualized reading program should commence with a thorough diagnosis of each student's reading ability.
3. Responsibility for organization of reading instruction rests with the classroom teacher primarily, not with the basic text, which is one of the teacher's tools.
4. Development in reading demands the careful articulation of the sequence of instruction.
5. The instructional sequence should utilize various kinds of materials at each step.
6. Student achievement throughout the instructional sequence should be recorded individually as it occurs.

From its inception the prototypic reading program was developed with the aid of reading consultants from the Madison Public Schools and from the R & D Center. Miss Ruth Saeman, reading consultant for the Madison Public Schools, and Dr. Wayne Otto, Principal Investigator for reading from the R & D Center, worked as major consultants throughout the entire year. The Unit leaders along with the reading consultants and R & D consultants laid plans for the year's work.

Steps were outlined to develop the program as follows:

1. Identification of the goals or objectives of reading program.
2. Identification of the major areas of a total reading program.

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3. Identification (outline) of cognitive skills for each level in each major area.
4. Construction of exercises evaluating progress at each level or identification of criteria to be used for systematic observation of student progress.
5. Individual placement of each child in the reading program on the basis of standardized diagnostic reading tests, informal reading tests, systematic teacher observations, and other accumulated information.
6. Identifying and developing appropriate instructional materials for all skills.
7. Utilization of the learning center of the school and the staff to provide for individual learning and pacing.
8. Continuous evaluation and feedback on each individual student.

The first step was accomplished with the help of the entire Huegel staff.

HUEGEL SCHOOL GOALS IN READING

Each child
— progresses at his own rate
— enjoys reading
— develops purposes for reading
— is able to use his reading skills in all subject areas
— uses reading to communicate
— reacts to reading with a questioning and searching attitude and personal involvement
— uses reading as a means of relating to the world— past, present, and future
— should develop a lifelong interest in reading.

Step 2 consisted of identifying the major areas of a complete reading program:

I. Word Recognition
II. Comprehension
III. Study Skills
IV. Self-Directed Reading
V. Interpretive Skills
VI. Creative Skills

The Madison Public Schools Reading Guide served as a beginning point for accomplishing Step 3. However, this guide outlines a reading program for each specific grade, so one of the big tasks was eliminating graded structures and the leveling of skills. Construction of a scope and sequence check list of reading skills was performed by the Unit leaders and Madison reading consultants. The simplified format of the scope and sequence was needed for use with pupils and to aid the teachers in keeping track of each individual child's progress. With the assistance of paraprofessionals in record keeping, the teacher was able to use these records to group children according to needs, especially in the skills area.

Central staff personnel, R & D Center assistants, and the Unit leaders participated in creating the assessment exercises required in Step 4. Exercises were constructed for major areas I, II, and III, and suggestions for teacher observation procedures have been written for major areas IV, V, and VI. These exercises and observation procedures will be employed as part of each child's reading program throughout his entire elementary school experience and will serve primarily as a continuous evaluation procedure for groupings and planning an instructional program. It was decided that an individual record folder which would be compact enough that teachers and children could refer to it constantly as children acquired skills would be kept, rather than a record that was checked only at report card time or the end of the year. Individual record folders were printed which gave at a quick glance a total picture of each child's reading level.

A decision had to be made about initial placement of each child. This seemed more acute at the primary level. The Botel reading inventory was administered to all children at the primary level. The results of this test, along with the teacher's observations, were used in January to place the children into an individualized program. Entirely new groups were formed mostly on the basis of the needs for certain skills.

Work continues on the remaining steps of the program. During the second semester of the 1966-67 school year, textbooks, supplementary reading material and the McGraw-Hill programed reading materials were used as the basic instructional materials.

The reading program being developed at Ray W. Huegel Elementary School represents a cooperative effort to design and implement a system for individualization of instruction. Each of the participants in this program has contributed a great deal of time and effort in planning this program. In the current year 1967–68 this reading program is in action with three R & I Units.

VI

FIELD TESTING R & I UNITS

James Wardrop and Mary Quilling
R & D Center

As indicated in Working Paper No. 4 (Wardrop et al., 1966), the field testing of the R & I Units in Madison was to be conducted by comparing the performance of students in the R & I Units with that of students in selected control schools. Table 13 indicates the locations and grade levels of the groups tested, as well as the testing instruments employed.

The kindergarten R & I Unit at Franklin School was excluded from the field test because of a lack of data from the control group.

All pretest data were collected prior to October 31, 1966, and posttests were administered the last week in April, 1967. All baseline data were analyzed using a 2 x 2 analysis of variance, with the factors being Group (R & I Unit or Control) and Sex (Male or Female). The purpose of these analyses was to determine the relative initial status of the groups. If, for example, one group were significantly superior to begin with, it would logically be expected to show more improvement during the school year than the other group. If significant criterion differences were then found favoring the initially superior group even after statistically removing the effects of the initial difference, the results might still reflect the fact that one group would be expected to show such a greater improvement.

Criterion data for all groups were analyzed using 2 x 2 analysis of covariance, with Group and Sex as factors in the analysis, as before. The covariates and criterion variables will be specified, and the results presented, by age-grade levels in the following sections.

Table 13

Locations, Grade Levels, and Measuring Instruments for Field Testing in the Madison (Wis.) Public Schools

Location of R & I Unit	Age-grade Level	Baseline Data	Criterion Tests
Franklin	1	Clymer-Barrett Prereading Battery	Gates-MacGinitie Reading Tests, Primary A Vocabulary, Comprehension
Huegel	P1	Clymer-Barrett Prereading Battery	Gates-MacGinitie Reading Tests, Primary A Vocabulary, Comprehension
Huegel	P2	California Test of Mental Maturity Gates-MacGinitie Reading Tests, Primary B Vocabulary, Comprehension	Gates-MacGinitie Reading Tests, Primary B Vocabulary, Comprehension
Marquette	6	Iowa Tests of Basic Skills: Total Language, Total Arithmetic	Iowa Tests of Basic Skills: Vocabulary, Reading, Arithmetic Concepts, Arithmetic Problems

THE PRIMARY ONE PUPILS AT HUEGEL SCHOOL

Baseline scores were obtained using the Clymer-Barrett Prereading Battery. The only significant effect ($p < .001$) was for the "Group" factor, with students in the R & I Unit being an

average of 10.34 points higher than those in the control group at another school.

A similar analysis was carried out on the criterion scores (vocabulary and comprehension scores from the Gates-MacGinitie Reading Tests), covarying out this initial difference (Table 14). These analyses indicated no significant difference for either main effect or for the interaction effect.

However, inspection of the table of means indicates that the Huegel School pupils did perform better than those at the control school. The distribution of scores indicates that the test did not have enough "top" for the students at Huegel. Furthermore, the grade score and percentile score equivalent to the mean raw score for each subgroup indicate that boys and girls at Huegel, and girls at the control school performed substantially better than average, while the control boys were just above grade level.

THE PRIMARY TWO PUPILS AT HUEGEL SCHOOL

An analysis of the three baseline measures revealed significant ($p < .001$) sex differences in favor of the females for both the Vocabulary and the Comprehension scores of the Gates-MacGinitie, and a significant ($p < .05$) difference in favor of the R & I Unit on the California Test of Mental Maturity scores. The mean difference between groups on this measure was 3.92 points.

These initial differences were taken into account by the analyses of covariance performed on criterion vocabulary and comprehension scores. In each analysis, the initial vocabulary or comprehension measure and IQ were used as covariates. While no significant differences were found in the analysis of vocabulary scores, Table 15 shows a significant sex effect on the comprehension score. The significant sex effect reflects the fact that the gains made by girls during the interim between test administrations was greater than that made by boys. Figure 2 portrays the performance of subgroups of both schools. Note that each group made a substantial gain on both subtests. The gains

Table 15

Analysis of Covariance on Scores of Primary Two Students at Huegel and Control Schools

Covariates: California Test of Mental Maturity IQ, Gates-MacGinitie Comprehension (Fall)

Dependent Variable: Gates-MacGinitie Comprehension (Spring)

Source of Variation	Degree of Freedom	Mean Square	F
Group	1	31.956	1.07
Sex	1	282.257	9.47**
Group x Sex	1	0.431	<1
Regression	2	1659.264	55.680***
Error	174	29.800	

** $p < .01$
*** $p < .001$

Table 14

Subgroup Raw Score Means, Grade Equivalents and Percentiles for Huegel and Glendale First Grades on the Gates-MacGinitie Reading Test— Primary A

		Test					
		Vocabulary			Comprehension		
School	Sex	Mean	Grade Equivalent	Percentile	Mean	Grade Equivalent	Percentile
Huegel (R & I)	Boys	40.94	2.5	62	25.98	2.4	73
	Girls	40.84	2.5	62	26.29	2.4	73
Control School	Boys	37.13	2.1	50	21.51	2.0	58
	Girls	40.18	2.4	62	25.13	2.3	69

range from 8 to 14 months for the control group and 12 to 19 months for the experimental group. Thus, although no significant differences between students in the R & I Unit and those in the control group were found, there is every reason to be satisfied with the performance of students in the R & I Unit at Huegel.

THE GRADE ONE UNIT AT FRANKLIN SCHOOL

As with the Huegel School Primary One Unit, the baseline data were scores on the Clymer-Barrett Prereading Battery. The only significant effect was for Groups ($p < .001$), with a mean difference of 13.92 points favoring students in the R & I Unit.

Criterion data were the Vocabulary and Comprehension scores from the Gates-MacGinitie. On both of these measures, after covarying out the Clymer-Barrett scores, significant differences ($p < .001$) were found favoring students in the control group.

However, inspection of raw score means and their grade equivalents (Table 16) indicates little difference in the mean performance of the groups. When one observes that the grade placement at the time of the criterion test was 1.8 and that the grade equivalents range from 1.6 to 1.9, in relatively disadvantaged neighborhoods, the results suggest that growth of students in both schools was adequate.

THE GRADE SIX UNIT AT MARQUETTE SCHOOL

Two baseline measures were employed: the (Total) Language and (Total) Arithmetic scores from the Iowa Tests of Basic Skills. The analysis of variance of these measures indicated one significant effect, a Sex effect on the Language measure. The mean for females exceeded that for males by 8.96 points in this case. There were no other significant effects for the baseline data. Criterion scores were the Vocabulary (V), Reading (R), Arithmetic

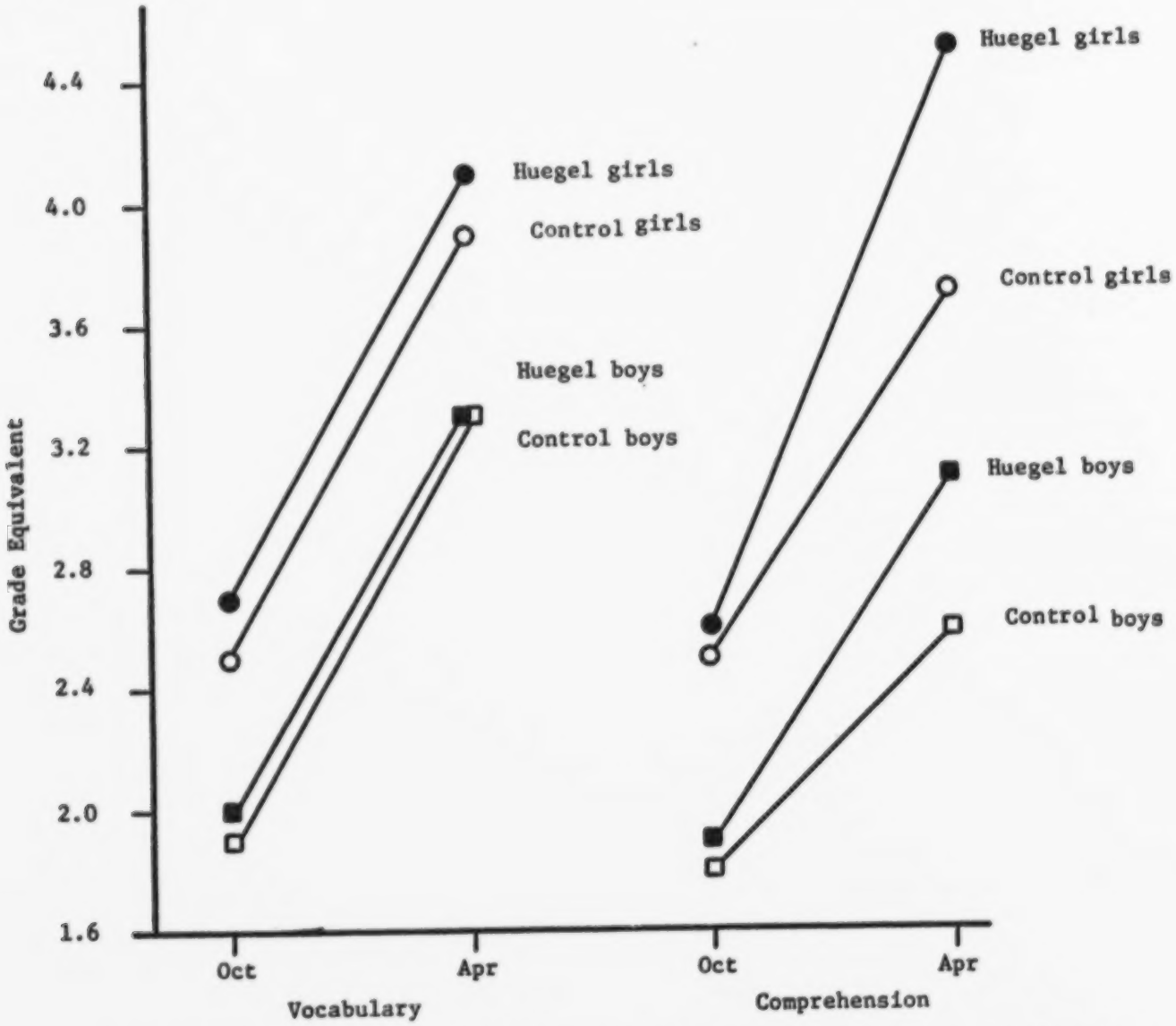

Figure 2— Mean Performance on Gates-MacGinitie Reading Tests, Primary B, Huegel and Control Schools, Primary 2

Table 16

Means and Grade Equivalents for Second Grade Students at Franklin and Control Schools on the Gates-MacGinitie Reading Tests Primary A

		Test			
		Vocabulary		Comprehension	
School	Sex	Mean	Grade Equivalent	Mean	Grade Equivalent
Franklin	Boys	29.56	1.6	17.90	1.7
	Girls	34.86	1.9	19.86	1.8
Control	Boys	31.48	1.7	18.79	1.7
	Girls	34.79	1.9	20.40	1.8

Concepts (C), and Arithmetic Problems (P) scores from the Iowa. Baseline Total Language scores were used as covariates for the V and R scores, and baseline Total Arithmetic scores as covariates for the C and P scores.

The analyses of covariance yielded no significant interactions, one significant sex difference (males 4.90 points superior to females on Vocabulary measure), and four significant group effects, summarized in Table 17.

In this case, the two groups did not differ significantly on baseline measures, but significant differences were found favoring the control group at the Control School on all criterion measures.

Table 17
Significant Group Differences on Criterion Measures, Grade Six R & I Unit, Marquette School

Variable	Group Favored	Difference Between Adjusted Means	F
Vocabulary	Control	4.84	8.42**
Reading	Control	9.58	14.31***
Arithmetic Concepts	Control	6.38	14.14***
Arithmetic Problems	Control	3.41	5.12*

* $p < .05$
** $p < .01$
*** $p < .001$

DISCUSSION

In the 1966–1967 field-testing program in Madison, the basic strategy employed was the control group method. Pretests were administered to both R & I Units and controls in the fall, and the same or an alternate form of the tests in the spring. Analyses of covariance were then computed to arrive at comparisons between the two groups.

Several serious problems were encountered with this procedure. First of all, securing an appropriate control group for any given Unit proved to be extremely difficult. In the absence of random assignment of students to groups (clearly impossible when the groups are in different schools) and of groups to treatments (R & I Units are located in schools on the basis of a number of factors, involving decisions of central staff representatives, building principals, teachers and the staff of Project MODELS in the R & D Center), extreme care must be taken to secure control groups which are closely matched to R & I Units on as many as possible of the relevant characteristics including racial balance, past achievement, mean and variability in IQ, and family background. Such matching must, in practice, involve many compromises with the idea, and some serious mismatching will inevitably occur.

At best, analyses of covariance, which control for differences in initial performance (but not for differential rates of change in performance), can be carried out only with the understanding that some of the underlying assumptions are going to be violated. At worst, there will be considerable contamination of such analyses because there is no way to take into account differences arising because of programs designed to improve the performance of students in the control schools, teacher

characteristics and behaviors which are thoroughly contaminated with groups, differences in school facilities, utilization of resources, unique and uncontrollable characteristics of the individual classrooms (and students) involved, unusual features of curricula, and many other factors not enumerated.

Another strategy for field testing was used extensively to supplement the control-group approach. In many cases, grade equivalent scores (using published norms) were obtained for fall and spring testing, and mean gains calculated for each Unit. These gains were then compared with expected gains based on the published norms and taking into consideration the interval between test administrations. Although not entirely satisfactory (see Working Paper No. 4), this strategy at least made it possible to make some meaningful comparisons.

A more desirable method would involve collection of data on a group of students over a period of several years prior to their inclusion in an R & I Unit. A pattern of growth could then be determined, and the effectiveness of the Unit evaluated on the basis of any deviations from this pattern. (Techniques of time-series analysis might appropriately be employed in this context.)

Even more desirable would be the establishment of objective (and subjective) criteria for the success of the R & I Unit, and the development of appropriate instruments for assessing the success of the Unit in meeting these criteria. Such a procedure would be a cooperative effort of subject-matter specialists and educational psychologists, and would include both cognitive and affective behaviors of both teachers and students.

Experiences in the 1966-1967 field-testing program indicated that the use of standardized achievement tests to evaluate R & I Units is unsatisfactory. The nature of such batteries as the Stanford Achievement Test and the Iowa Tests of Basic Skills, with their orientation toward traditional curricula, results in their being unfair tests in situations in which innovative and developmental activities are emphasized. When a third-grade R & I Unit focuses on the processes of scientific inquiry, while the tests are oriented toward knowledge of particular scientific facts, the results are unfortunate. Indeed, it is surprising that students in some R & I Units performed as well as they did on standardized tests.

If the assumption is made that the tests used to evaluate R & I Units in Madison are appropriate, the resulting conclusion is that the Franklin Grade 1 and Marquette Grade 6 Units were not successful in improving the academic performance of their students. The Huegel Primary Unit (including both levels 1 and 2), while not showing a significantly superior achievement level when adjustment was made for initial achievement and ability, did outperform the control school groups.

TEACHER OPINION SCALE

The Opinion Scale was administered to learning specialists and teachers of R & I Units, teachers in classrooms designated as controls for field testing purposes, and building principals of schools containing R & I Units and control classes. The discussion is limited to learning specialists and teachers since incomplete data were available for the principals. To obtain a fairly large sample, data from Racine and Janesville R & I Units and control schools were combined with Madison data for purposes of analysis.

Table 18 indicates the mean total scores and subscores for various divisions of the questionnaire. For each item, the statement which presented the most favorable alternative was scored highest, with decreasing scores representing less favorable statements, and a score of 0 or 1 indicating the least favorable. Each subscore is a sum of scores for the items related to that area of measurement. Maximum possible scores for each subdivision are as follows: Instruction 34, Research 14, Development 17, Innovation 22, Effect on Teachers 21, Effect on Students 39, and Utilization 8.

In every case, the scores for the R & I Unit personnel are greater than those for the control teachers indicating the superiority of this organization according to these areas of measurement. Substantial differences exist between total scores and instruction subscores for these two groups. The latter indicates that R & I instructional staff noted the value of designing a model instructional program, of involvement in research projects, and of team planning. They were also more satisfied with their total instructional program.

The data were analyzed using a frequency count procedure. A sum of scores for each alternative was obtained and the percent of each group choosing each alternative was determined. Many noteworthy differences were found between the R & I and control groups.

Student behavior, achievement, motivation, and attitudes were reportedly better in R & I classes than in control classrooms. Moreover, greater satisfaction with student behavior and motivation was expressed by R & I Unit personnel than by control teachers.

Opportunities for initiating new procedures and innovations were more marked in the R & I situation than in the control classrooms. A

Table 18

Mean Scores on Teacher Opinion Scale

GROUP	TOTAL SCORE	Instruc-tion	Research	Develop-ment	Innova-tion	Effect on Teachers	Effect on Students	Utiliza-tion
Learning Specialists	113.85	23.38	9.96	15.54	19.69	17.04	26.50	6.46
R & I Teachers	105.55	22.08	10.58	14.55	17.88	16.02	24.02	4.98
R & I Total	108.82	22.60	10.34	14.94	18.60	16.42	25.00	5.56
Control Teachers	95.89	17.86	8.54	13.54	16.36	16.04	23.32	3.82

substantially greater number of R & I staff felt that the instructional materials available to them were of superior quality.

Teachers in R & I Units felt they had made greater use of their system's consultant and service staff, and also placed greater value on consultant help from outside the school system. Learning specialists, particularly, utilized the services of these consultants.

Another important difference was that 89% of the learning specialists and 54% of the R & I teachers felt that their professional growth was greater than normal in their current position, while only 35% of the control teachers reported this growth.

VII
CONCLUDING STATEMENT

The main purposes of R & I Units are to provide excellent instruction for children and to carry out research and development activities that are essential to improving instruction. During the 1966–67 school year, one school was completely organized into two large R & I Units functioning respectively at the initial skills and independent study levels. Additionally, four grade-level Units were established at three other schools.

Individualization and motivation were the focal points of the research or development projects, with special attention given to language arts. The staff's concern for providing more adequately for individual differences led to the developmental reading study at Huegel School, and to experiments at Franklin and Longfellow Schools in techniques of enriching the language of disadvantaged children. The motivational value of various reading materials and of concrete rewards was studied in the Marquette School experiment.

The language enrichment programs at Franklin and Longfellow Schools, while not demonstrably superior to the control treatments, must be weighed in terms of the brief duration of the experiments. In both instances students in the experimental groups showed progress as great or greater than that of control students. Further study is needed on the effects of intensive and systematic language programs throughout the kindergarten and primary years.

While a comparison of the linguistic and basal reader approach to first-grade reading instruction at Franklin School failed to yield significant differences, the results suggest that there is an interaction between method and sex. The linguistic approach was found effective for females, while the basal reader approach was more successful with the boys. That instruction was effective overall is indicated by the near grade-level performance of the lower third of the pupils.

At Marquette School the effects on a student's reading performance of highly appealing reading materials and of concrete rewards were studied. Students using materials such as reading laboratories and high-interest, low-ability readers outperformed those using traditional texts. The results of the motivational manipulation were unclear, but suggested that concrete rewards may be an effective reinforcement when used by some teachers or for some children.

The developmental work in reading done at Huegel School in the 1966–67 school year is continuing in this, the following, school year. Working in a building planned and organized to facilitate individualized, non-graded programs, the school staff worked with the Madison reading consultants and with the R & D Center staff, particularly Dr. Wayne Otto, in developing a scope and sequence of reading skills. Preliminary experience with diagnosis of weaknesses and placement of children was gained last year. Meanwhile, field testing results for the Huegel primary children indicate that typical performance was considerably above grade level by the end of the year.

The preceding results provide evidence that the R & I Units performed their research and development functions well. In order that a more concentrated effort could be directed toward a more complete program, the decision was made to have two schools— Franklin and Huegel— completely organized into R & I Units for the 1967–68 school year.

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